DETERMINANTS, HYPERBOLICITY, AND INTERLACING

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Abstract. Writing a multivariate polynomial as the determinant of a matrix of linear forms is a classical problem in algebraic geometry and complexity theory. Requiring that this matrix is Hermitian and positive definite at some point puts topological and algebraic restrictions on the polynomials that appear as the determinant and its minors. In particular the real zero sets of these polynomials are hyperbolic (or real stable) and interlace. I'll talk about the beautiful geometry behind these determinants and its connection to optimization and combinatorics.